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Remarks

The Office Action mailed December 28, 2006 has been carefully considered together with each of the references cited therein. The amendments and remarks presented herein are believed to be fully responsive to the Office Action. Accordingly, reconsideration of the present Application in view of the following remarks is respectfully requested.

Applicant has amended the claims to more clearly recite what Applicant believes to be the invention. In claim 1 and in claim 19, Applicant replaced the term "aromatic content" with the term "total aromatic content". Also in claims 1 and 19, Applicant added the requirement that the fuel oil to which the copolymer is added has a combined poly- and di- aromatic content of less than 2.5% by weight of the distillate, and the requirement that the copolymer has a molar ratio of component b) to component c) of from 0.4 to 2.0. In claims 9 and 27, Applicant replaced the term "aromatic content" with the term "total aromatic content" to agree with the amended term in claims 1 and 19. Support for the amendment to claims 1, 9, 27 and 19 may be found in originally filed claims 1, 9, 27, and 19 and Applicant's examples and noted hereinbelow. Table 2 on page 18, provides the physical properties of the test oils which contrasts test oils (1, 2 and 3) having a content of less than 2.5 weight percent di and poly aromatics, with a test oil (4) having a content of di and poly aromatics of 4 weight percent.

(Portions of Table 2) **Table 2: Parameters of the test oils**

			Test oil 1	Test oil 2	Test oil 3	Test oil 4 (comp.)
Cloud Point		[°C]	-9.8	-22.2	-10.0	-9.3
CFPP		[°C]	-14	-27	-11	-14
Paraffin 10° below CP (DSC)			4.2%	3.6%	4.5%	2.7%
Density 15°C		[g/cm³]	0.828	0.831	0.828	0.842
Sulfur content			8	26	9	420
Aromatic content		[% by wt.]	14.3	18.3	16.7	24.6
of which	mono	[% by wt.]	12.6	15.7	15.1	20.6
	di	[% by wt.]	1.5	2.2	1.2	3.4
	poly	[% by wt.]	0.2	0.3	0.4	0.6

In Table 1b), reproduced hereinbelow, examples P1 to P16 are shown with a calculated molar ratio of comonomer (b) to vinyl acetate (comonomer (c)):

Table 1b: Characterization of the terpolymers

Example No.	Vinyl acetate	Branched monomer	Σ comonomers		V_{140}	Molar Ratio Monomer (b) to Vinyl acetate (c)
	[mol%]	[mol%]	[mol%]	[% by wt.]	[mPas]	
P1	4.80	7.60	12.40	44.00	147	1.58
P2	4.60	8.00	12.60	44.80	194	1.74
P3	4.70	7.70	12.40	43.90	63	1.64
P4	4.70	8.30	13.00	45.70	171	1.77
P5	5.70	7.80	13.50	45.70	166	1.37
P6	4.50	9.30	13.80	48.10	167	2.07
P7	7.00	7.90	14.90	47.70	167	1.13
P8	7.40	7.80	15.20	47.80	186	1.05
P9	10.80	5.10	15.90	46.20	128	0.47
P10	11.20	4.60	15.80	44.20	142	0.41
P11	7.20	7.30	14.50	43.80	132	1.01
P12 (comp.)	8.70	1.60	10.30	28.80	168	0.18
P13 (comp.)	2.90	7.00	9.90	30.00	218	2.41
P14 (comp.)	13.70	1.40	15.10	37.80	97	0.10
P15 (comp.)	13.30	0.00	13.30	32.00	140	0.00
P16 (comp.)	0.00	7.50	7.50	36.40	176	----

In Table 1(b) the inventive compositions P1 to P11 can be characterized by having a molar ratio of comonomers of formula b) to comonomers of formula c) of from 0.4 to 2.0. The comparative tests are shown as P12 to P16 which have a molar ratio of comonomers (b) to comonomers (c) which is outside the range of 0.4 to 2.0. It is believed that no new matter is introduced by this amendment and no additional search is required.

Applicant's invention is directed to providing additives and methods for improving the cold flow properties of middle distillates which have a low sulfur content and an aromatics content which can be characterized by a total di- and poly-aromatic content of less than 2.5 weight percent, when the blending of the additive and the oil take place at low blending temperatures. Applicant surprisingly discovered that the additives which achieved the objectives of the invention comprised a copolymer of ethylene, and comonomers of formula (b) such as branched vinyl esters, and comonomers of formula (c) such as vinyl acetate, and the additive had a molar ratio of branched comonomer b) to comonomer c) from 0.4 to 2.0. Tables 3 – 6 show the effectiveness of the additives of the present invention in terms of improved filterability (Table 3) and improved Cold Filter Plugging Point (CFPP) response (Tables 4-6) in Test Oils 1, 2 and 3, which contained di- and poly-aromatic contents of below 2.5 wt%. Additives having a molar ratio of comonomer (b) to comonomer (c) outside the range of 0.4 to 2.0 failed to achieve this effectiveness.

Claims 1-14, 16, 17, and 19-20 were rejected under 35 U.S.C. 103(a) as being unpatentable over Brown (US 5,906,663) in view of Murakami (US 5,730,762). The rejection of claim 1 as amended under 35 U.S.C. 103(a) as being unpatentable over Brown (US 5,906,663) in view of Murakami (US 5,730,762) should be withdrawn for the reason that one of ordinary skill in the art would not have had a reasonable expectation of success in combining the references suggested by the Examiner. Brown discloses fuel composition having improved cold flow properties when an additive is added to the fuel oil, wherein the additive comprises a terpolymer comprising monomers which include vinyl acetate (similar to Applicant's formula 3 and a vinyl carboxylate (similar to Applicant's formula 2). Brown further

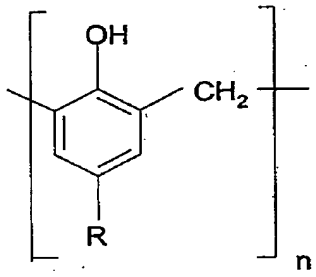
discloses that the fuel oil may be a middle distillate and that other coadditives may be present. Brown differs from Applicant's invention in that Brown does not disclose the sulfur content, the aromatics content, or the poly-aromatics content of the fuel oil. Thus, Brown does not disclose all of the elements of Applicant's invention. Murakami discloses gas oils suitable for use in cold districts which have poly-cyclic aromatic contents ranging from 3.5 wt% to 15 wt%. Murakami at column 2, lines 10-18 teaches away from Applicant's invention by disclosing that a content of polycyclic aromatic hydrocarbon higher than 15 wt-% will lead to exhaust gas containing more particulates, and that a content of polycyclic aromatic hydrocarbons lower than 3.5 wt-% will result in inferior anti-wear properties of the fuel oil. Thus, Brown fails to disclose all of the elements of Applicant's invention and no one skilled in the art would be motivated to combine the disclosure of Brown and with the disclosure of Murakami as suggested by the examiner in view of the criticality of the range of polycyclic aromatics disclosed in Murakami. Furthermore, Applicant has provided data hereinabove which clearly show the unexpected improvements in filterability and CFPP for additives having Applicant's composition which includes a molar ratio of comonomers (b) to comonomers (c) of between 0.4 and 2.0 for fuel oils having a low sulfur content and having a di- and poly-aromatic content of less than 2.5wt-%. Therefore, the rejection of claim 1 as amended under 35 U.S.C. 103(a) as being unpatentable over Brown (US 5,906,663) in view of Murakami (US 5,730,762) should be withdrawn for the reason that Brown does not disclose all of the elements of Applicant's invention as claimed and for the reason that no one skilled in the art would combine Brown with the Murakami reference, because the Murakami teaches away from such a combination for fuel oils having a di- and poly-aromatic content of less than 2.5wt-%.

The rejection of claims 2-14, 16, 17 under 35 U.S.C. 103(a) as being unpatentable over Brown (US 5,906,663) in view of Murakami (US 5,730,762) should be withdrawn for the reasons given in support of claim 1 from which they depend.

The rejection of claims 19-30 under 35 U.S.C. 103(a) as being unpatentable over Brown (US 5,906,663) in view of Murakami (US 5,730,762) should be

withdrawn for the reasons given in support of claim 1 and for the reason that neither Brown nor Murakami or any combination thereof discloses a method for improving the cold flow properties of a fuel oil of Applicant's composition wherein the additive comprises a terpolymer having a molar ratio of comonomers according to formula (b) to comonomers of formula (c) ranging from 0.4 to 2.0 for treating fuel oils having a di- and poly-aromatic content less than 2.5 wt-% of the fuel oil. Furthermore Murakami teaches away from the claimed combination as stated hereinabove.

Claim 15 was rejected under 35 U.S.C. §103(a) as being unpatentable over Brown and Murakami as applied to claims above, and further in view of WO 9314178. WO 9314178 discloses an additive composition comprising a resin which is described on page 3 as a phenolic resin of the general form shown below as a precursor for the hydrophobic part, the hydroxy groups of which have been condensed to form oxyalkylated groups.



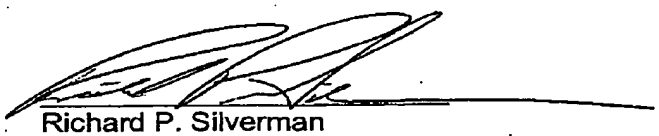
Such compounds are alkoxylated alkylphenol aldehyde resins, **not alkylphenol-aldehyde resins. An alkoxylated alkylphenol is not an alkyl-phenol, because the alkylphenol requires a phenolic OH group**. Alkoxylated alkylphenols do not comprise a phenolic OH group. Furthermore, the WO reference does not disclose any of the elements missing from the Brown reference, and as discussed hereinabove, the Murakami reference can not be combined with the Brown reference, because Murakami teaches away from such a combination. Still further, claim 15 depends from claim 1 and should be allowable for the reasons given in support of amended claim 1.

It is respectfully submitted that, in view of the above remarks, the objections to the claims for formal matters, and the rejections under 35 U.S.C. §103 should be withdrawn and that this application is in a condition for an allowance of all pending

claims. Accordingly, favorable reconsideration and an allowance of all pending claims are courteously solicited.

An early and favorable action is courteously solicited.

Respectfully submitted,



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